

EXHIBIT A

Br J Nutr. 1976 Nov;36(3):317-35.

Milk-substitute diet composition and abomasal secretion in the calf.

Williams VJ, Roy JH, Gillies CM.

The effect of different protein sources in milk-substitute diets on abomasal acidity and proteolytic activity was studied in Friesian calves, aged 20-58 d (Expt 1). The diets contained 'mildly' preheated, spray-dried skim-milk powder (MHM), severely preheated, spray-dried skim-milk powder (SHM), fish-protein concentrate (FPC) or solvent-extracted soya-bean flour (SF) as the main protein source. 2. Gastric juice was collected from abomasal pouches before feeding and at 15 min intervals for 8 h after the morning feed. Samples of digesta were obtained from the abomasum at 1 h intervals during the same period. 3. Digesta pH was lower and titratable acidity higher 0.3 after giving the diet containing MHM than when any of the other three diets was given. 3. Acid secretion from the pouches for the different diets was in the order: FPC greater than MHM greater than SHM greater than or equal to SF. 5. Protease secretion from the pouches, assayed at pH 2.1, was in the order: MHM greater than SHM = FPC greater than SF. 6. The effect of dry matter (DM) intake and concentration on abomasal acidity was also studied in calves given diets which contained MHM (Expt 2). This diet was reconstituted at either 100 or 149 g DM/kg liquid diet and fed at either 32.5 or 49.0 g DM/kg live weight 0.75 per d. Samples of abomasal digesta were collected as in Expt 1. 7. A high intake of DM at a low DM concentration resulted in low acidity of the digesta in the first 3 h after feeding, which suggested a dilution effect. Comparison of two diets of different DM concentration, which were fed in the same volume of liquid, indicated that the greater the DM intake, the greater was the amount of acid secreted. 8. It is concluded that the protein sources varied in their ability to stimulate abomasal acid and protease secretion and it is suggested that this may relate to calf performance.

Arch Tierernahr. 1978 Mar;28(3):173-86.

[The digestibility of milk substitutes with various soybean products in young calves]

Bedő S, Baročsai G, Vučković A.

Digestibility trials were performed to study the suitability of mixtures made up of treated soybean and whey powder for replacing skim milk powder. Three different milk replacers were used, the replacers T-18/II and T-18/III containing Plyllac preparations manufactured by different technologies. When using the T-18 preparation with 18% fat content it was found that the protein source may contain 25% Plyllac preparation and 11% sweet whey powder. In two cases, at the age of 5 and 7 weeks, the digestibility of the crude protein in the T-18/II preparation was found to deteriorate significantly. For this reason, the authors suggest this milk replacer to be used from the 5th week of life. Trials were performed with 3 milk replacers (lactine preparations) containing Plyllac preparations of different manufacturing technology (35%), treated soybean (10%) and sweet whey powder (10%). It was found that the use of Plyllac preparations, i.e. of treated soybean in larger amounts causes the nutrient digestibility, mainly that of crude protein, to be significantly lower at the age of 3 and 5 weeks than that at the age of 7 to 9 weeks. No significant differences were found in the digestibility of the various Plyllac preparations manufactured by different technologies. The milk replacer lactine is recommended for use from the 5th week of life on

Arch Tierernahr. 1978 Mar;28(3):187-97.

[Effect of milk substitutes with various soy bean products on the N metabolism in calves]

Bedő S, Baročsai G, Vučković A.

N-balance trials on young calves aged 3, 5, 7, 9 and 11 weeks, respectively, revealed that a mixture of soybean and whey powder accounting for 39.5% of the total protein amount can be fed without any disadvantage. Feeding this mixture gave N-balance results differing only slightly in the groups aged 7, 9 and 11 weeks. The milk replacer with a higher proportion of soybean and whey powder revealed a more unfavourable N-balance. This allows to conclude that milk replacers containing soybean preparations can be successfully applied to young calves from 5 weeks on, no disadvantages being likely as to N-balance and live weight gain.

J Am Diet Assoc. 1981 Jun;78(6):606-8.

Protein quality and the cost of selected commercial protein supplements.

Timmons KH, Pace R, Anderson SD, Svacha AJ.

The biologic value and the cost of three commercial protein supplements were compared using casein as the control. Each product was fed to rats as the sole protein source supplying 10 percent of the energy in a semipurified diet. Nonfat dry milk was equal to casein in PER, but the PERs of low-fat soy powder and high-protein supplement were significantly lower than the PER of casein. Nitrogen balance was positive for all protein supplements, but low-fat soy powder was significantly lower than the others. cost comparison per gram of protein showed low-fat soy powder to be the least expensive, nonfat dry milk to be slightly higher in cost, and the high-protein supplement to be the most expensive.

J Assoc Off Anal Chem. 1989 Jul-Aug;72(4):622-6.

Amino acid rating method for evaluating protein adequacy of infant formulas.

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Amino acid profiles and/or protein digestibility (by the rat balance method) were determined for various forms (powder, ready-to-use, liquid concentrate, etc.) of cow's milk- and soy-based infant formulas obtained from 4 manufacturers. The essential amino acid data of the formulas were compared with that of human milk for the calculation of amino acid scores (based on the single most limiting amino acid). The product of amino acid score and total protein (g/100 kcal) was then termed "amino acid rating." Amino acid scores for the milk- and soy-based formulas ranged from 59 to 90 and from 59 to 81%, respectively, due to deficiencies in sulfur amino acids and/or tryptophan. Because of significantly higher total protein contents (g/100 kcal) of soy- (2.65-3.68) and milk-based (2.20-2.95) infant formulas compared to human milk (1.5), the relative amino acid ratings (human milk = 100) for all infant formulas except 2 liquid concentrates (having values of 87%) were above 100%. Values for true digestibility of protein in milk- and soy-based formulas ranged from 87 to 97 and from 92 to 95%, respectively. When corrected for protein digestibility, the relative amino acid ratings for all the milk-based liquid concentrates were below 100% (77-98%).

In the below reference the soy proteins were probably not fully denatured, so there is some interference w/trypsin in the guts and w/digestibility.

J Anim Sci. 1989 Jun;67(6):1634-41.

Substitution of milk protein with isolated soy protein in calf milk replacers.

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The influence of replacement of milk protein by isolated soy protein on digestion and pancreatic enzyme secretion was determined in nine Holstein male calves. Calves (average weight 47 kg) were fitted with permanent re-entrant pancreatic and a T-type cannula in the distal ileum at 6 to 10 d of age. Following a 2-wk recuperation period, the calves were fed three milk replacers in a triplicated 3 x 3 latin square. Experimental diets consisted of a control, in which 100% of the CP originated from spray-dried skim milk powder (SM), and the test diets, in which 50% (SM/ISP) or 100% (ISP) of the skim milk protein was replaced by isolated soy protein. Each experimental period lasted 2 wk. Replacement of SM protein by ISP decreased (P less than .05) the digestibilities of protein and most amino acids. Ileal digestibilities of total indispensable amino acids for SM, SM/ISP and ISP diets were 82.1, 75.8 and 61.8%, respectively, and total tract digestibilities of total indispensable amino acids were 90.0, 82.6 and 74.0%, respectively. Including ISP did not affect (P greater than .05) the volume of secretion of pancreatic juice, protein or chymotrypsin; however, the secretion of trypsin decreased (P less than .05). Reduction in trypsin secretion may be responsible, in part, for the lower amino acid digestibilities in milk replacers containing isolated soy protein.

Arch Latinoam Nutr. 1993 Sep;43(3):241-7.

[Development of soy-based protein candy bars for athletes]

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Two varieties of soy-based candy bars were developed for sportsmen who need a higher protein intake. The two varieties, almond and nut, were covered with chocolate. The ingredients used were isolated soy protein, texturized soy flour, milk solids, cocoa powder, toasted oat, nuts, almonds, authorized flavors, preservatives and antioxidants.

Controls were carried out in the optimized products, and the results indicate a very good sensory and microbiological quality. The average nutritional composition of both varieties is: 12,4% proteins, 9% lipids and 58,7% carbohydrates, and the caloric value is 375,2 kcal/100 g. A shelf-life study was performed at room temperature with the candy bars packed in an aluminium foil. Determining that the quality remains without significant changes during 30 days for the nut candy, and at least for 60 days for the almond candy bar.